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EXAMINER	
SHECHTMAN, SEAN P	
ART UNIT	**PAPER NUMBER**
2125	

DATE MAILED: 10/12/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/042,509	ELLIOTT ET AL.	
	Examiner	Art Unit	
	Sean P. Shechtman	2125	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 July 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-7* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *26 July 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *26 July 2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-7 are presented for examination. Claim 3 has been amended.

Drawings

2. Objections withdrawn due to the amendment.

Specification

3. The disclosure is objected to because of the following informalities: Referring to the amendment beginning on page 12, line 8, the examiner respectfully submits that "calalations" should be rephrases calculations. Appropriate correction is required.

Claim Objections

4. Objection withdrawn due to the amendment.

Claim Rejections - 35 USC § 102

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Pat. No. 5,590,051 to Yokozawa.

Referring to claim 1, Yokozawa discloses a predictive algorithmic model (Col. 1, lines 35-55) for simulating photocatalytic reactions (Fig.9; Fig. 10; Col. 2, lines 1-41; Col. 5, lines 35-39) comprising: an input section for defining a plurality of variables (Col. 2, line 18; Col. 3, lines 58-60; Figs. 5-7; Col. 4, lines 1-40); a calculation section for calculating a plurality of intermediate values and a plurality of output values (Col. 4, lines 1-11; Col. 4, lines 29-32; Figs. 5-7; Col. 4, lines 1-40); and an output section for providing the plurality of output values of the photocatalytic reactions (Col. 4, lines 12-17; Col. 4, lines 31-40; Figs. 9; Fig. 10; Figs. 5-7; Col.

4, lines 1-40). Examiner respectfully submits that a photocatalytic reaction is any reaction promoted or stimulated by light. Yokozawa teaches the vapor phase reaction models are based on a vapor phase reaction wherein material gases are decomposed by light so that a molecule which is liable to react (i.e., a reactant), is produced. Therefore the claim limitations are believed to be met.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

6. Claims 2 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Pat. No. 5,590,051 to Yokozawa as applied to claim 1 above, and further in view of U.S. Pat. No. 5,911,858 to Ruffner.

Referring to claim 2, Yokozawa teaches all of the limitations disclosed above and further teaches the initial conditions for the simulation include the materials (Col. 4, lines 24-25) and photocatalytic reaction variables (Col. 3, line 65 – Col. 4, line 3).

Referring to claim 2, Yokozawa teaches all of the limitations disclosed above, however, Yokozawa fails to teach that the initial conditions include wavelength. Referring to claim 7, Yokozawa teaches all of the limitations disclosed above, however, Yokozawa fails to teach that the light is ultraviolet.

The claims, as such, do not require that the variables be process parameters or that the variables be associated with a predictive algorithmic model for simulating photocatalytic reactions. The claim, as such, does not require any particular placement of the input section, or that the input section is required to be in the model. The claim, as such, does not require input to

the input section. The claim, as such, does not require that the defined plurality of variables be related to the calculation section or output section. The claim, as such, does not require that the variables even be related to a simulation of photocatalytic reactions.

However, referring to claims 2 and 7, Ruffner teaches analogous art, wherein initial conditions for a computer modeling program for a deposition profile are DUV or EUV wavelengths (Col. 12, lines 10-14 and 27-48 of '858). Ruffner goes on to teach the initial conditions for the simulation include the materials and photocatalytic reaction variables (Col. 6, lines 23-50; Col. 10, lines 53-66).

Therefore, it would have been obvious to one of ordinary skill in the art at the time that the invention was made to combine teachings of Ruffner with that of Yokozawa. One of ordinary skill in the art would have been motivated to combine these references because Ruffner teaches photolithography system for employing a high precision multi-layered mirrors for use with either a DUV or EUV radiation source. Furthermore, Ruffner teaches the ability to predict and achieve a wide range of thickness profiles on substrates, and the ability to predict and accommodate necessary changes in sputter deposition rate as a result of plasma geometry (Col. 6, line 23 – Col. 7, line 10 of '858).

7. Claims 3-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Pat. No. 5,590,051 to Yokozawa as applied to claim 1 above, and further in view of U.S. Pat. No. 6,156,654 to Ho.

Referring to claims 3-5, Yokozawa teaches all of the limitations disclosed above and further teaches the model above, wherein the plurality of variables include gas pressure (Col. 5, line 54 – Col. 6, line 65; Col. 11, lines 7-18), first and second reactant types (Col. 4, lines 24-25),

a material absorption coefficient (Col. 2, lines 34-41), an angle of incidence (Col. 7, lines 48-57), and first and second photochemical reaction parameters (Col. 4, lines 1-39).

Referring to claims 3 and 4, Yokozawa teaches all of the limitations disclosed above, however, Yokozawa fails to teach the above, wherein the plurality of variables include at least a laser wavelength, a base fluence value, a fluence increment value, a first gas partial pressure, a partial pressure increment, a total pressure, a material threshold value, a material refractive index, wherein the first laser wavelength is in the range of 100 to 400 nm. Referring to claim 5, Yokozawa teaches all of the limitations disclosed above, however, Yokozawa fails to teach the above, wherein the plurality of intermediate values include first and second optical gas densities, an incident fluence absorbed by gas, a reflected fluence, a total fluence absorbed by gas, a fluence absorbed in material, an ablation depth per pulse, and a photochemical component.

The claims, as such, do not require that the variables be associated with a predictive algorithmic model for simulating photocatalytic reactions. The claim, as such, does not require any particular placement of the input section, or that the input section is required to be in the model. The claim, as such, does not require input to the input section. The claim, as such, does not require the defined plurality of variables be related to the calculation section or output section. The claim, as such, does not require that the variables even be related to a simulation of photocatalytic reactions.

However, referring to claim 3, Ho teaches analogous art, wherein the plurality of variables include at least a laser wavelength, a base fluence value, a fluence increment value, a first gas partial pressure, a partial pressure increment, a total pressure, first and second reactant types, a material absorption coefficient, a material threshold value, a material refractive index, an

angle of incidence, and first and second photochemical reaction parameters (Figs. 11-17; Cols. 3-6 of '654). Referring to claim 4, Ho teaches the first laser wavelength is in the range of 100 to 400 nm (Col. 6, lines 10-31). Referring to claim 5, Ho teaches analogous art, wherein the plurality of intermediate values include first and second optical gas densities, an incident fluence absorbed by gas, a reflected fluence, a total fluence absorbed by gas, a fluence absorbed in material, an ablation depth per pulse, and a photochemical component (Figs. 11-17; Cols. 3-6 of '654).

Therefore, it would have been obvious to one of ordinary skill in the art at the time that the invention was made to combine teachings of Ho with those of Yokozawa. One of ordinary skill in the art would have been motivated to combine these references because Ho teaches a method to improve thickness uniformity across a semiconductor wafer. Furthermore, Ho teaches using a laser to increase the efficiency between Ti and Si reactions (Col. 1, line 62 – Col. 2, line 30 of '654).

8. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Pat. No. 5,590,051 to Yokozawa as applied to claim 1 above, and further in view of U.S. Pat. No. 5,421,934 to Misaka.

Referring to claim 6, Yokozawa teaches all of the limitations disclosed above, however, Yokozawa fails to teach the plurality of output values includes a total material removed and removal efficiency.

The claim, as such, does not place any restriction on where the output values are output. The claim never requires that the calculated output values are output values of photocatalytic reactions. The claim, as such, does not require any particular placement of the output section in

the model, in fact, the claim, as such, does not even require that the output section be in the model. The claim, as such, does not require the defined plurality of variables be related to the output section.

However, referring to claim 6, Misaka teaches analogous art, wherein the plurality of output values includes a total material removed and removal efficiency (Col. 3, lines 34-38; Col. 5, lines 1-14; Col. 7, lines 43-62; Figs. 5, 9, and 10 of '934).

Therefore, it would have been obvious to one of ordinary skill in the art at the time that the invention was made to combine teachings of Misaka with that of Yokozawa.

One of ordinary skill in the art would have been motivated to combine these references because Misaka teaches a new surface reaction model to simulate topological evolutions by taking into account the existence of absorbed radicals on the substrate surface (Abstract of '934). Furthermore, Misaka teaches a topological simulator that can determine optimum etching conditions (Col. 3, lines 8-57 of '934).

Response to Arguments

9. Applicant's arguments, see page 8, filed July 26th 2004, with respect to the rejection of claim 1 under 35 U.S.C. 103(a) as being unpatentable over U.S. Pat. No. 6,049,661 to Hayakawa in view of U.S. Pat. No. 5,246,529 to Fukasawa, or, in view of "A Monte Carlo simulation of laser ablation during the laser pulse: Cl2(s) ablation dynamics for neutral beam etching" by Suzuki, have been fully considered and are persuasive. The rejections of Hayakawa in view of Fukasawa, or, in view of Suzuki have been withdrawn.

10. Applicant's arguments filed July 26th 2004, with respect to the rejection of claim 1 under 35 U.S.C. 102(b) as being anticipated by U.S. Pat. No. 5,590,051 to Yokozawa, have been fully considered but they are not persuasive.

11. Applicant argues that Yokozawa fails to disclose a predictive algorithmic model for simulating photocatalytic reactions. Applicant argues that Yokozawa fails to disclose simulating photocatalytic reactions. The examiner respectfully disagrees.

The examiner respectfully submits that Yokozawa does teach a predictive algorithmic model for simulating photocatalytic reactions in more ways than one.

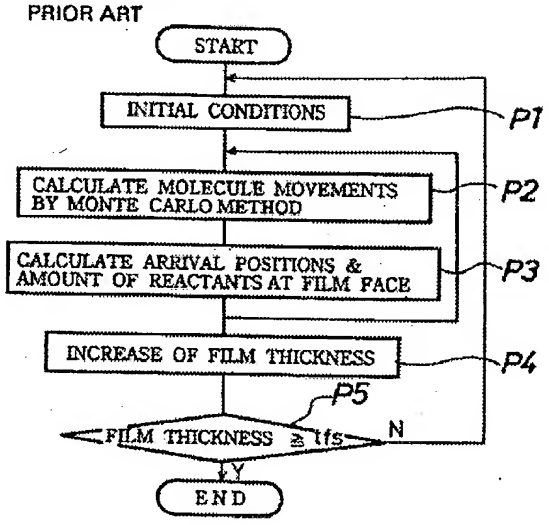
Yokozawa teaches the prior art process simulator wherein optimum conditions for achieving a desired process are automatically set (Col. 1, lines 36-40). Yokozawa teaches the prior art model, wherein, in the vapor phase, gases are decomposed by heat, light, or plasma so that a molecule which is liable to react (i.e., a reactant), is produced. Yokozawa goes on to teach how, within this prior art model, the reactant collides with other molecules, arrives at the substrate, and then reacts with or reflects off of the substrate (See Fig. 9; Col. 2, lines 1-15). The examiner respectfully notes figure 10 of the prior art below and column 2, lines 16-41 corresponding thereto.

The claim, as such, does not place any restriction on what the variables are, what the intermediate values are, what the output values are, where any calculations are made, or where the output values are output. In fact, "the plurality of output values of the photocatalytic reactions" in the body of the claim is not even required to be predicted, modeled, simulated, calculated or input, and could very well be interpreted as actual measured output values of real photocatalytic reactions. The claim never requires that the calculated output values are output

values of photocatalytic reactions. The claim, as such, does not require any particular placement of the input section, calculation section or output section in the model, in fact, the claim, as such, does not even require that the input section, calculation section or output section be in the model. The claim, as such, does not require input to the input section. The claim, as such, does not require the defined plurality of variables be related to the calculation section or output section. The claim, as such, does not require that the variables even be related to a predictive algorithmic model, simulation of photocatalytic reactions, or a predictive algorithmic model for simulating photocatalytic reactions. The claim, as such, does not require that any calculations be performed in a functional relationship to predictive algorithmic modelling, simulation of photocatalytic reactions, or a predictive algorithmic model for simulating photocatalytic reactions.

The claim is so broad that the Yokozawa reference can read on it in a number of ways. For example, the examiner respectfully submits that element P1 of figure 10 below is an input section for defining a plurality of variables (Col. 2, lines 16-20), the calculation sections of P2 or P3 are a calculation section for calculating a plurality of intermediate values and a plurality of output values (Col. 2, lines 20-27), elements P4 or P5 of figure 10 below are an output section for providing the plurality of output values of the photocatalytic reactions (Col. 2, lines 27-41). Other ways of interpreting how the Yokozawa reference can read on the claim are clearly present, such as, for example, considering the P2 element as an input section defining variables to be used in the P3 element.

FIG.10
PRIOR ART



Furthermore, the invention of Yokozawa itself does also read on the claimed invention. Yokozawa teaches several sections for setting initial conditions or inputting parameter variation ranges or fixed process conditions as an input section for defining a plurality of variables (Fig. 5-7; Col. 4, lines 1-40). Yokozawa teaches several sections for determining of arriving species and arriving positions or simulating conditions as a calculation section for calculating a plurality of intermediate values and a plurality of output values (Figs. 5-7; Col. 4, lines 1-40). Yokozawa teaches any of various output values of the photocatalytic reactions in figures 5-7 and column 4, lines 1-40.

Furthermore, even though the Yokozawa reference does disclose a predictive algorithmic model for simulating photocatalytic reactions, the recitation "a predictive algorithmic model for simulating photocatalytic reactions" has not been given patentable weight because the recitation occurs in the preamble. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or

structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951).

12. Applicant appears to argue that the section of Yokozawa, referenced by the examiner with respect to simulating photocatalytic reactions, is actually describing a prior art process simulator in which a step coverage of a thin film formed by a conventional CVD process is calculated.

The examiner respectfully disagrees with this analysis. While the examiner believes that the prior art discussion of Yokozawa, as discussed above, meets all of the required claim limitations, the examiner respectfully submits that the invention of Yokozawa meets all of the required claim limitations as well.

Yokozawa teaches "a simulation for optimization of a step coverage in a CVD process is required to simulate vapor phase reactions and film surface reactions non-empirically ***as described hereinabove in connection with the prior art (Col. 5, lines 35-39).*** The examiner respectfully submits that this clearly states that the model used in the prior art is used in conjunction with the optimization. The examiner respectfully believes that no further explanation is necessary, and the same modeling technique of simulating photocatalytic reactions used in the prior art discussion of Yokozawa is clearly also a part of the invention of Yokozawa, and that this is clear to one of ordinary skill in the art.

However, should applicant continue to argue the validity of the rejection, at least in this interpretation of how the Yokozawa reference reads on the claimed invention, the examiner would respectfully ask that applicant point out where in the Yokozawa reference, that applicant speculates the Yokozawa reference either implicitly, expressly, or inherently teaches that the

simulations regarding vapor phase reactions could have been modeled by any means other than the heat, light, or plasma stimulated modeling of reactions of colliding and moving reactants taught in column 2, lines 1-15 and column 5, lines 35-39 which are in the detailed description of the preferred embodiment of the invention of Yokozawa.

Additionally, the examiner respectfully invites applicant's attention to the appropriate paragraph of 35 U.S.C. 102(b) that clearly states:

> A person shall be entitled to a patent unless – (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The examiner respectfully submits that 35 U.S.C. 102(b) does not place any requirements on where, in the patent, the invention must be disclosed.

13. Applicant's arguments filed July 26th 2004, with respect to the rejection of claims 2 and 7 under 35 U.S.C. 103(a) as being unpatentable over U.S. Pat. No. 5,590,051 to Yokozawa as applied to claim 1 above, and further in view of U.S. Pat. No. 5,911,858 to Ruffner, have been fully considered but they are not persuasive.

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., "the various process parameters associated with a photocatalytic reactions", see page 9, 3rd paragraph of the amendment filed July 26th 2004) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). In fact, not only do the claims not require that any variables are process parameters, the claims do not even require that the variables be associated with a predictive algorithmic model for simulating photocatalytic reactions.

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, one of ordinary skill in the art would have been motivated to combine these references because Ruffner teaches photolithography system for employing a high precision multi-layered mirrors for use with either a DUV or EUV radiation source. Furthermore, Ruffner teaches the ability to predict and achieve a wide range of thickness profiles on substrates, and the ability to predict and accommodate necessary changes in sputter deposition rate as a result of plasma geometry (Col. 6, line 23 – Col. 7, line 10 of '858).

14. Applicant's arguments filed July 26th 2004, with respect to the rejection of claim 6 under 35 U.S.C. 103(a) as being unpatentable over U.S. Pat. No. 5,590,051 to Yokozawa as applied to claim 1 above, and further in view of U.S. Pat. No. 5,421,934 to Misaka, have been fully considered but they are not persuasive.

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., "the various process parameters associated with a photocatalytic reactions", see page 10, 1st paragraph of the amendment filed July 26th 2004) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

In fact, not only do the claims not require that output values or total material removed or removal efficiency be process parameters, the claims do not even require that the output values be associated with the calculation section or the output section and therefore, the claims do not require that the output values even be associated with photocatalytic reactions or a predictive algorithmic model for simulating photocatalytic reactions.

Conclusion

15. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sean P. Shechtman whose telephone number is (703) 305-7798. The examiner can normally be reached on 9:30am-6:00pm, M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo P. Picard can be reached on (703) 308-0538. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SPS

Sean P. Shechtman

October 1, 2004

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